

PINE BEETLES

HOW THEY ARE DEPLETING
OUR WESTERN FORESTS
AND WHAT CAN BE DONE ABOUT IT

THIS PINE BEETLE PORTFOLIO
PREPARED FOR THE

WESTERN PINE ASSOCIATION

CALIFORNIA FRUIT GROWERS EXCHANGE

CALIFORNIA STATE CHAMBER OF COMMERCE

KLAMATH FOREST PROTECTIVE ASSOCIATION

NORTH IDAHO FOREST PROTECTIVE ASSOCIATION

WESTERN FORESTRY AND CONSERVATION ASSOCIATION

TIMBER PRODUCTS BUREAU, SPOKANE CHAMBER OF COMMERCE

DENVER MOUNTAIN PARKS
PROTECTIVE AND IMPROVEMENT ASSOCIATION

AND OTHER

INTERESTED PUBLIC AND PRIVATE
FOREST CONSERVATION AGENCIES,

FROM
FACTS, STATISTICS AND PHOTOGRAPHS

SUPPLIED BY THE
U. S. DEPARTMENT OF AGRICULTURE
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE
DIVISION OF FOREST INSECT INVESTIGATIONS

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PINE BEETLES ARE A THREAT TO FOREST RESOURCES

TIMBER IS ONE OF THE GREAT NATURAL RESOURCES UPON WHICH THE WEALTH AND SECURITY OF THIS NATION DEPENDS. THE HARVESTING AND UTILIZING OF TIMBER CROPS GIVES EMPLOYMENT TO THOUSANDS OF WORKERS IN MANY WESTERN STATES. MUCH OF THE VIRGIN TIMBER IN WESTERN PINE FORESTS IS NOW RIPE AND READY TO HARVEST. WILL THIS RESOURCE CONTINUE TO CONTRIBUTE TO THE NATIONAL WEALTH THROUGH SUSTAINED PRODUCTION OF THE SAW MILLS AND THE PAY ROLLS OF FACTORIES AND INDUSTRIES DEPENDENT ON PINE PRODUCTS? OR WILL THE MATERIAL IN THE FOREST SERVE ONLY TO SATISFY THE APPETITES OF MILLIONS OF TINY BARKBEETLES?

THE LUMBERMEN OF THE WEST, OWNERS OF MILLS BOTH LARGE AND SMALL, WOULD LIKE TO KNOW HOW MUCH TIMBER IS GOING TO BE AVAILABLE FOR THEIR MILLS SO THAT THEY CAN PLAN FOR THE FUTURE. UNCONTROLLED BARK-BEETLE DEPREDACTIONS MAKE THIS A HAZARDOUS UNDERTAKING.

LABORERS ARE VITALLY INTERESTED, BECAUSE 67,000 EMPLOYEES IN MILLS AND WOODS ARE DIRECTLY DEPENDENT FOR THEIR LIVELIHOOD UPON THE HARVESTING OF PINE TIMBER FROM WESTERN FORESTS. INCLUDING THE FAMILIES OF THESE WORKERS, 250,000 PEOPLE ARE DIRECTLY SUPPORTED AND ARE DEPENDENT UPON WESTERN PINE TIMBER. IF THE WOODWORKING, TRANSPORTING AND SERVICE INDUSTRIES ARE INCLUDED, SOME 400,000 PEOPLE ARE DIRECTLY OR INDIRECTLY CONCERNED WITH THE CONTINUED PRODUCTIVITY OF WESTERN PINE FORESTS.

FARMERS WANT TO KNOW IF THEIR CHEAP SUPPLY OF LUMBER, LOCALLY PRODUCED, IS TO CONTINUE; AND WHERE AND FOR HOW LONG THEY CAN GET LUMBER FOR FARM BUILDINGS AND FOR THE BOXES IN WHICH THEY MARKET THEIR PRODUCTS.

BUSINESSMEN IN THE MANY COMMUNITIES DEPENDENT UPON THE CONTINUED PRODUCTION OF FOREST INDUSTRIES WANT TO KNOW WHETHER FOREST DEPLETION WILL JEOPARDIZE THE EXISTENCE OF THE COMMUNITIES WHICH THEY SERVE.

THE AVERAGE MAN WHO HAS A SUMMER HOME IN THE MOUNTAINS, OR WHO VISITS A MOUNTAIN RESORT FOR HIS VACATION WANTS TO BE SURE THAT LIVING TREES, NOT UNSIGHTLY SNAGS, WILL PROVIDE THE SETTING FOR HIS OUTDOOR RECREATION.

TOWNS AND COUNTIES DEPENDENT UPON TAX REVENUES FROM FOREST LANDS FOR THE SUPPORT OF THEIR SCHOOLS AND LOCAL GOVERNMENTS WANT TO KNOW TO WHAT EXTENT BEETLE CAUSED LOSSES WILL REDUCE THEIR INCOME.

THE ANSWERS TO THESE QUESTIONS ARE OF GREAT PUBLIC INTEREST.



FORESTS OF THE WEST - A NATIONAL RESOURCE

PONDEROSA PINE, SUGAR PINE, WESTERN WHITE AND LODGEPOLE PINE - THESE ARE THE CHIEF SPECIES OF PINE WHICH FORM AN IMPORTANT PART OF OUR FOREST WEALTH, WHICH SUPPLY VARIED INDUSTRIAL NEEDS AND ARE VITAL TO THE ECONOMY OF THE WESTERN STATES.

THESE SPECIES, WHICH CONSTITUTE A RESERVE OF 300 BILLION BOARD FEET OF SAW TIMBER, HAVE GROWN SLOWLY, ARE MATURE AND REPRESENT A HERITAGE FROM THE PAST FOR USE IN THE FUTURE.

FOREST INDUSTRIES EMPLOYING, EITHER DIRECTLY OR INDIRECTLY, OVER 400,000 PEOPLE ARE DEPENDENT UPON THE PRESERVATION AND CAREFUL UTILIZATION OF THIS RESOURCE.

PROTECTION OF THIS RESOURCE IS RECOGNIZED AS THE FIRST ESSENTIAL OF ANY PLAN OF FOREST CONSERVATION. FOREST PROTECTION PROGRAMS HAVE CENTERED INTEREST ON EFFICIENT ORGANIZATIONS TO COMBAT FIRE AND CONTROL DISEASES SUCH AS BLISTER RUST. INSECTS MUST LIKEWISE BE CONTROLLED IF THE FORESTS ARE TO BE GIVEN FULL PROTECTION.

FOREST INSECTS MUST BE CONTROLLED IF WE ARE TO ACHIEVE THE BALANCED PROTECTION PROGRAM THAT IS SO NECESSARY FOR THE WISE USE OF THIS NATIONAL RESOURCE.



FOREST INSECTS - AGENTS OF DESTRUCTION

PINE BEETLES ARE CONVERTING THIS GREAT FOREST RESOURCE FROM A VALUABLE ASSET TO WORTHLESS AND HAZARDOUS WASTE IN THE FOREST.

OVER WIDE AREAS, SUCH AS THOSE ILLUSTRATED HERE, PINE TIMBER VALUES MAY BE ENTIRELY DESTROYED WITHOUT BENEFIT TO MAN, THROUGH THE UNCHECKED RAVAGES OF THESE BEETLES. IN THE PINE FORESTS OF THE ENTIRE WEST, DURING THE PAST 10 TO 15 YEARS, PINE BEETLES HAVE WASTED 600 BOARD FEET OF TIMBER FOR EVERY 1000 BOARD FEET UTILIZED BY MAN.

OVER ONE-THIRD OF THE 24 MILLION ACRES OF PINE FOREST IN CALIFORNIA, OREGON AND WASHINGTON ARE NOW HIGH HAZARD AREAS AND SUBJECT TO SEVERE INSECT DAMAGE.

STOPPING INSECT CAUSED LOSSES IN THE PONDEROSA PINE FORESTS OF THE WEST FOR ONE YEAR WOULD CONTRIBUTE AS MUCH TO THE TIMBER RESOURCES AS THREE OR FOUR YEARS OF NORMAL GROWTH, AND ALSO WOULD SAVE HIGH QUALITY TIMBER THAT COULD NOT BE REPLACED IN LESS THAN 300 TO 400 YEARS.

THE PROBLEM IS TO CONSERVE AND UTILIZE THE PORTION OF THIS TIMBER RESOURCE THAT IS NOW BEING LAID WASTE BY BARKBEETLES, AND TO STOP EPIDEMIC ACTIVITIES OF THESE INSECTS IN OUR PINE FORESTS OF THE WEST.





THE PROGRESS OF DESTRUCTION

THE FIRST
PHASE —
SCATTERED
GROUPS OF
RED TREES



DYING AND
DEAD TREES
MERGE INTO
LARGE GROUPS
AS THE
BEETLES
MULTIPLY
IN NUMBER

BARKBEETLE EPIDEMICS DESTROY MATURE FORESTS

FOR LONG PERIODS IN THE LIFE OF A FOREST, THESE INSECTS MAY BE IN RELATIVELY SMALL NUMBERS, KILLING NO MORE THAN 10 TO 20 TREES ANNUALLY IN EACH SQUARE MILE. THEN RATHER SUDDENLY NATURAL CONDITIONS MAY BECOME FAVORABLE FOR THEIR INCREASE. IN GENERAL IT CAN BE SAID THAT BARKBEETLE EPIDEMICS BUILD UP FROM ATTACKS ON SINGLE TREES OR SMALL GROUPS, FINALLY CULMINATING IN LARGE GROUPS OF AS HIGH AS 200 TREES. THESE EPIDEMICS MAY LAST ONLY A FEW YEARS, OR THEY MAY EXTEND OVER LONGER PERIODS UNTIL PRACTICALLY ALL TREES SUSCEPTIBLE TO ATTACK ARE KILLED.

THE FINAL
RESULT OF
SUSTAINED
BARKBEETLE
ACTIVITY
IN A
PONDEROSA
PINE STAND



CUMULATIVE LOSS FROM INSECTS

WITHIN A
15 - YEAR
PERIOD
INSECTS
DESTROYED
78 PERCENT
OF THE
MERCHANTABLE
TIMBER

This is the record from one sample
plot of 320 acres in Modoc County,
California.



THIS FOREST GREW SLOWLY THROUGH CENTURIES, BUT IN 15 YEARS ABOUT $\frac{4}{5}$ OF ITS VALUE WAS DESTROYED AS BARKBEETLES INVADDED THE AREA. ONLY $\frac{1}{5}$ REMAINED TO BE LOGGED AND UTILIZED.

ALTHOUGH THIS RECORD ILLUSTRATES AN EXTREME CONDITION REPRESENTATIVE OF AREAS OF VERY HIGH HAZARD, SIMILAR STAND DEPLETIONS CAN OCCUR ELSEWHERE. OTHER WIDELY SCATTERED SAMPLE PLOT RECORDS ATTEST TO THE GREAT ACTUAL AND POTENTIAL DESTRUCTIVENESS OF PINE BEETLE INFESTATIONS IN THE PONDEROSA PINE STANDS OF THE WESTERN UNITED STATES.



THE WESTERN PINE BEETLE,
INSECT ENEMY NUMBER
ONE OF PONDEROSA PINE.

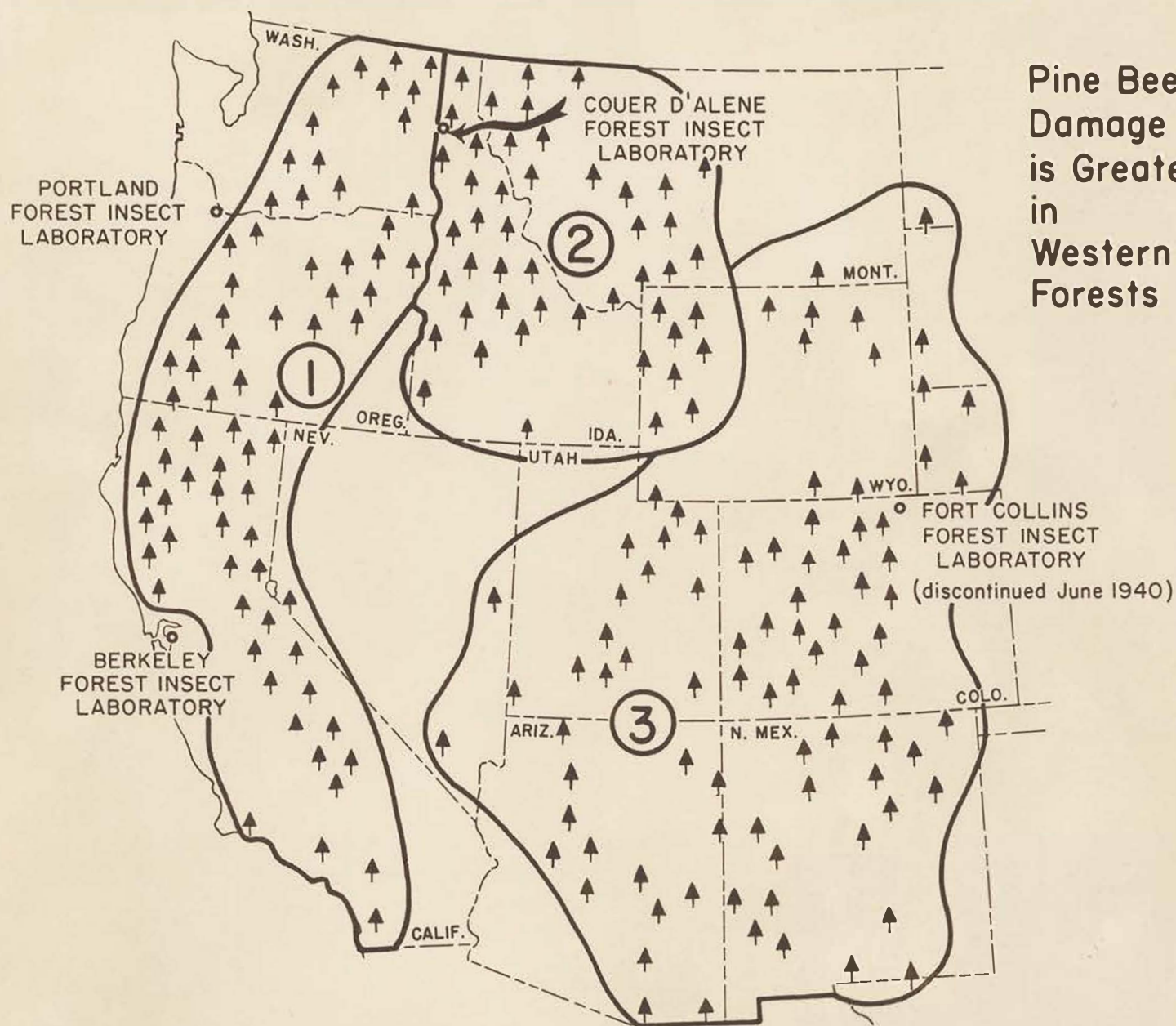


THE MOUNTAIN PINE BEETLE,
MOST IMPORTANT INSECT
ENEMY OF WHITE PINE,
SUGAR PINE AND LODGE-
POLE PINE.

THE INSECTS THAT KILL PINES

FOREST INSECTS THAT COMPETE MOST INTENSIVELY WITH MAN FOR THE REMAINING SUPPLY OF MERCHANTABLE TIMBER ARE THE BARKBEETLES. NOT ONE, BUT SEVERAL SPECIES OF THESE BEETLES ARE CONCERNED. IN THE PONDEROSA PINE STANDS OF CALIFORNIA, OREGON AND WASHINGTON, THE WESTERN PINE BEETLE IS OF GREATEST IMPORTANCE. THERE, THROUGH RECURRING EPIDEMICS, IT HAS DEPLETED LARGE AREAS OF HIGH QUALITY TIMBER. IN THE NORTHERN ROCKY MOUNTAIN REGION, THE MOUNTAIN PINE BEETLE CAUSES WIDESPREAD KILLING OF ALL NATIVE PINES. QUITE SIMILAR IN HABITS AND APPEARANCE, THE BLACK HILLS BEETLE IS A WHOLESALE DESTROYER OF PONDEROSA PINE IN THE SOUTHERN ROCKY MOUNTAIN REGION.

THE AREA AFFECTED



**Pine Beetle
Damage
is Greatest
in
Western
Forests**

ALL PINE FORESTS OF THE WEST ARE FREQUENTLY SUBJECTED TO PINE BEETLE EPIDEMICS. THE MOST SERIOUS LOSSES AT PRESENT ARE BEING CAUSED BY:

- (1) THE WESTERN PINE BEETLE IN PONDEROSA PINE STANDS OF CALIFORNIA, OREGON AND WASHINGTON.
- (2) THE MOUNTAIN PINE BEETLE NOW ATTACKING THE VALUABLE WHITE AND LODGEPOLE PINE STANDS OF IDAHO, MONTANA AND WYOMING.
- (3) THE BLACK HILLS BEETLE ATTACKING PONDEROSA AND LODGEPOLE PINE STANDS OF THE ROCKY MOUNTAIN REGION.



PINE BEETLES SHORTEN THE LIFE OF LUMBER INDUSTRIES

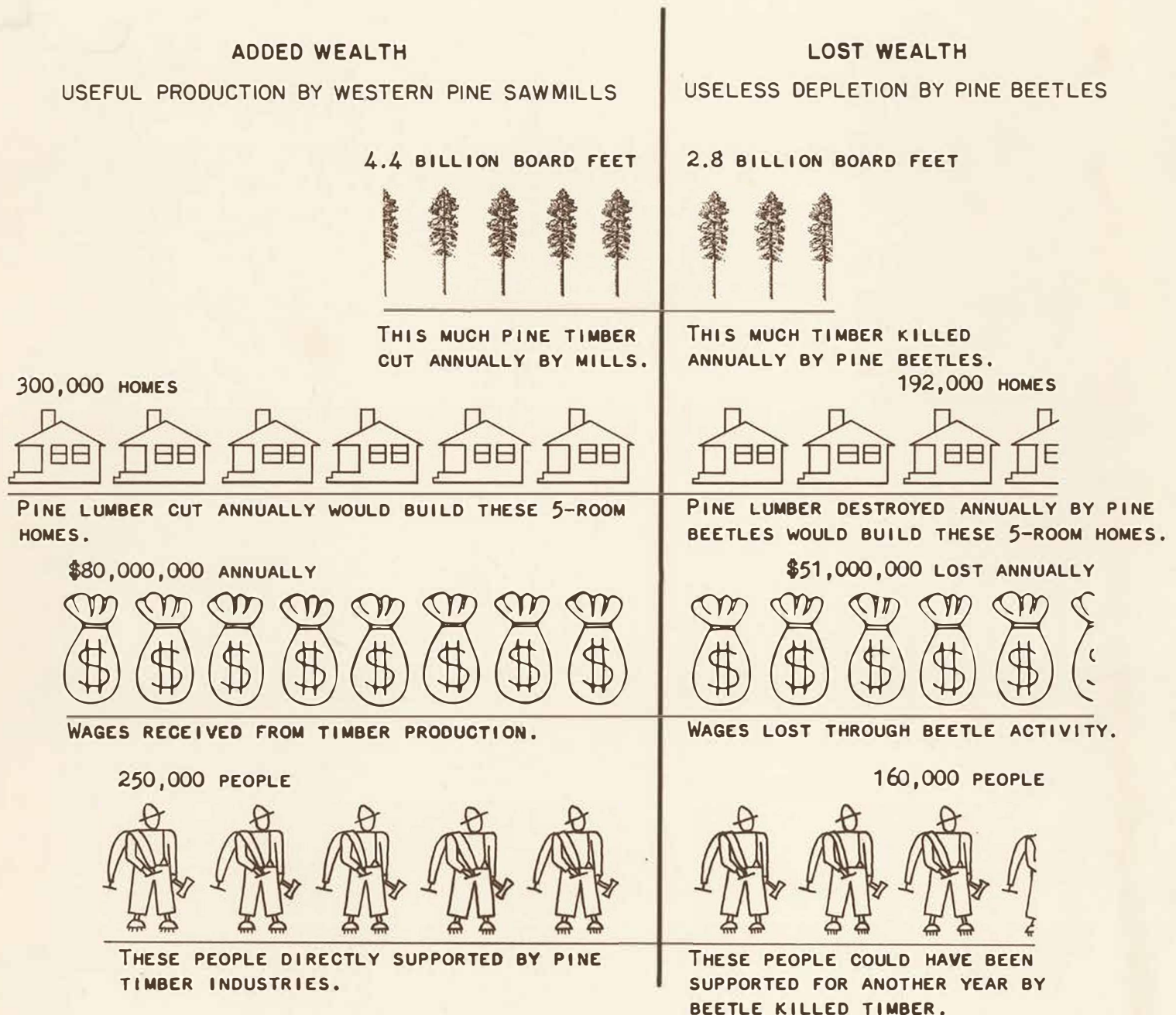
THE LIFE OF LUMBER INDUSTRIES WILL CONTINUE ONLY SO LONG AS THE PRESENT RESERVE OF MATURE TIMBER HOLDS OUT, SUPPLEMENTED BY NEW GROWTH COMING INTO MERCHANTABLE SIZE. NOT ONLY LARGE PLANTS, BUT ALSO THE OPERATORS OF SMALL LOCAL SUPPLY MILLS ARE AFFECTED.

IF INSECT CAUSED LOSSES IN THE PINE REGION CONTINUE FOR THE NEXT TWENTY YEARS AS THEY HAVE FOR THE PAST TWO DECADES, THEY WILL HAVE DESTROYED 53 BILLION BOARD FEET OF STUMPAGE - ENOUGH RAW MATERIAL TO CONTINUE THE OPERATING LIFE OF PINE MILLS FOR AT LEAST 12 YEARS.

THE SLOW REPLACEMENT OF GROWTH WILL NOT COMPENSATE FOR THE TOLL WHICH THE BEETLES HAVE BEEN TAKING. IT REQUIRES FROM 3 TO 4 YEARS OF NORMAL GROWTH TO SATISFY THE APPETITE OF THE BEETLES FOR ONE SEASON.

EITHER CONTROL OR UTILIZATION OF THIS INSECT CAUSED WASTE IS NECESSARY TO PERPETUATE OUR TIMBER SUPPLY.

THE EFFECT OF WESTERN PINE BEETLES ON NATIONAL ECONOMY



FUTURE WAGES ARE LOST THROUGH BEETLE DAMAGE

WHEREAS EVERY 1000 BOARD FEET OF PINE TIMBER MANUFACTURED INTO LUMBER PRODUCES \$10 IN WAGES, THAT WHICH IS DESTROYED BY BEETLES IS A TOTAL LOSS TO LABOR.

LAST YEAR THE TOTAL PAYROLL OF THE WESTERN PINE INDUSTRY AMOUNTED TO \$80,000,000, BUT "THE PINE BEETLE LOGGING COMPANY", WHICH CUT 6/10 AS MUCH AS ALL PINE MILLS PUT TOGETHER, PAID NO WAGES. THE \$51,000,000 WHICH THIS TIMBER WOULD EVENTUALLY HAVE PRODUCED IN WAGES WAS FOREVER LOST.

WHAT HAS BEEN DONE
TO FIND A SOLUTION
TO THE PROBLEM

AT FIELD LABORATORIES
SUCH AS THE ONE SHOWN HERE
STUDIES AND EXPERIMENTS
HAVE BEEN CARRIED ON UNDER
ACTUAL CONDITIONS IN THE
WOODS. A NUMBER OF CONTROL
METHODS HAVE BEEN DEVELOP-
ED AND TESTED.



THE POSSIBILITIES OF INDIRECT CONTROL METHODS
HAVE BEEN EXPLORED

SOME OF THESE PROPOSED METHODS TESTED HAVE SHOWN
PROMISE - OTHERS HAVE BEEN ELIMINATED AS IMPRACTICABLE.



PROTECTION OF TREES BY INJECTING CHEMICALS INTO
THEM HAS BEEN TRIED, BUT THIS METHOD IS NOT EASILY
ADAPTED TO FOREST CONDITIONS. IN THE STANDING TREE
(LEFT) A RUBBER RESERVOIR NEAR THE BASE HOLDS A CHEMI-
CAL SOLUTION WHICH IS CARRIED INTO THE SAP STREAM.
SO FAR, ALL THE CHEMICALS THAT HAVE BEEN TOXIC TO PINE
BEETLES HAVE ALSO KILLED THE TREES. THE METHOD IS USE-
FUL, HOWEVER, IN PROTECTING TREATED WOOD FROM FURTHER
ATTACK AND IN PRESERVING RUSTIC LOGS.

NATURAL OR BIOLOGICAL CONTROL IS NATURE'S WAY OF
KEEPING DESTRUCTIVE INSECTS IN CHECK. WHEN THE NATURAL
BALANCE IS DISTURBED, PINE BEETLE OUTBREAKS OCCUR AND
VAST NUMBERS OF TREES MAY BE KILLED. NATURAL CONTROL
CANNOT BE DEPENDED UPON TO PROTECT OUR MATURE PINE
FORESTS.



ARTIFICIAL PROPOGATION OF PREDATORS OF THE PINE
BEETLE (LOWER LEFT) HAS ALSO BEEN TRIED EXPERIMENTALLY,
BUT NO IMPROVEMENT UPON NATURE'S RATHER INEFFECTIVE
METHODS HAS YET BEEN DISCOVERED.

DIRECT METHODS HAVE BEEN DEVELOPED THAT ARE EFFECTIVE IN KILLING BEETLES.

THESE METHODS HAVE BEEN WIDELY USED IN PRACTICE. PROJECTS INVOLVING THE TOTAL EXPENDITURE OF SEVERAL MILLIONS OF DOLLARS HAVE BEEN CARRIED OUT BY PRIVATE TIMBERLAND OWNERS, AND BY NATIONAL FORESTS, NATIONAL PARKS AND STATE AGENCIES.

FALLING THE INFESTED TREE (UPPER RIGHT), PEELING AND THEN BURNING THE BARK, DESTROYS THE BROODS OF BEETLES SO THAT THEY DO NOT EMERGE AND ATTACK OTHER LIVING TREES. THIS METHOD HAS LONG BEEN IN USE, AND IS AS YET THE MOST EFFECTIVE MEANS OF CHECKING WIDESPREAD PINE BEETLE EPIDEMICS.

FUEL OIL, SPRAYED ON THE TRUNKS OF STANDING TREES, (RIGHT) IS USED IN SOME REGIONS TO FIRE THE BARK AND SCORCH THE BROODS. THIS METHOD SPEEDS UP THE PROGRESS OF CONTROL WORK AND REDUCES COSTS, BUT ITS EFFECTIVENESS IS LIMITED TO TREES OF SMALLER SIZE.

WHERE BURNING IS NOT SAFE, TREATMENT OF INFESTED TREES WITH TOXIC OILS HAS BEEN TRIED (LOWER RIGHT). THE SUCCESS OF THIS METHOD DEPENDS UPON PENETRATION OF THE OIL THROUGH THE BARK WHERE IT KILLS LIVING BROODS ON CONTACT. IT HAS BEEN FOUND TO BE MOST EFFECTIVE IN THIN-BARKED TREES SUCH AS LODGEPOLE PINE.

THE NET EFFECT OF ALL DIRECT METHODS OF CONTROL IS TO REDUCE BEETLE POPULATIONS. WHILE THEY DO NOT SAVE THE DEAD OR INFESTED TREES, THEY DO PROTECT THE SURVIVING STAND. THE DISADVANTAGE IN THEIR USE IS THAT THEY ARE COSTLY AND THEY DO NOT KEEP THE INSECTS UNDER CONTROL FOR LONG PERIODS UNLESS THE WORK IS REPEATED IN THE SAME AREAS. WHERE LOGGING IS IMPRACTICABLE, HOWEVER, THESE DIRECT CONTROL METHODS ARE THE ONLY ONES AVAILABLE.



SANITATION LOGGING

A Recent Development In Pine Beetle Control

WHEN BEETLES START TO INVADE AN AREA, THEY FIRST SELECT "HIGH RISK" TREES - THOSE WHICH ARE SLOWING DOWN IN THEIR GROWTH RATES, AND WHICH MAY HAVE BEEN INJURED BY OTHER INSECTS THAT WEAKEN BUT DO NOT KILL TREES. HIGH RISK TREES CAN BE RECOGNIZED BY VISIBLE CHARACTERS IN THE CROWN. (SEE #3 BELOW.)



1. A-RESISTANT TREE.

THIS IS A TREE WITH VIGOROUS CROWN WHICH CAN BE HELD IN THE STAND FOR LONG PERIODS.



2. A WEAKENED TREE.

THIS TREE SHOWS THE FIRST SIGNS OF WEAKENING, BUT IT MAY SURVIVE FOR YEARS.



3. A HIGH RISK TREE.

ALREADY INSECTS ARE ATTACKING THE TOP. THIS TREE WILL SUC-CUMB WITHIN A FEW YEARS, BUT IF LOGGED NOW IT WILL YIELD SOUND LUMBER.



4. A TREE RECENTLY KILLED BY PINE BEETLES.

ALREADY THE WOOD IS BLUE-STAINED AND MERCHANTABLE VALUES HAVE BEEN LOST.

THERE IS ENOUGH HIGH RISK MATERIAL TO SUPPLY THE ENTIRE ANNUAL CUT OF THE MILLS IN THE PACIFIC SLOPE PINE REGION. CONTROL THROUGH UTILIZATION DEPENDS ON DEVELOPMENT OF LOGGING METHODS AND CUTTING PROGRAMS.



MODERN EQUIPMENT HAS MADE POSSIBLE
SELECTIVE LOGGING
OF HIGH RISK TREES

VALUES IN THE TREE CAN BE UTI-
LIZED SO THAT FOREST SANITATION AS
A METHOD OF INSECT CONTROL YIELDS
A RETURN TO THE OPERATOR.

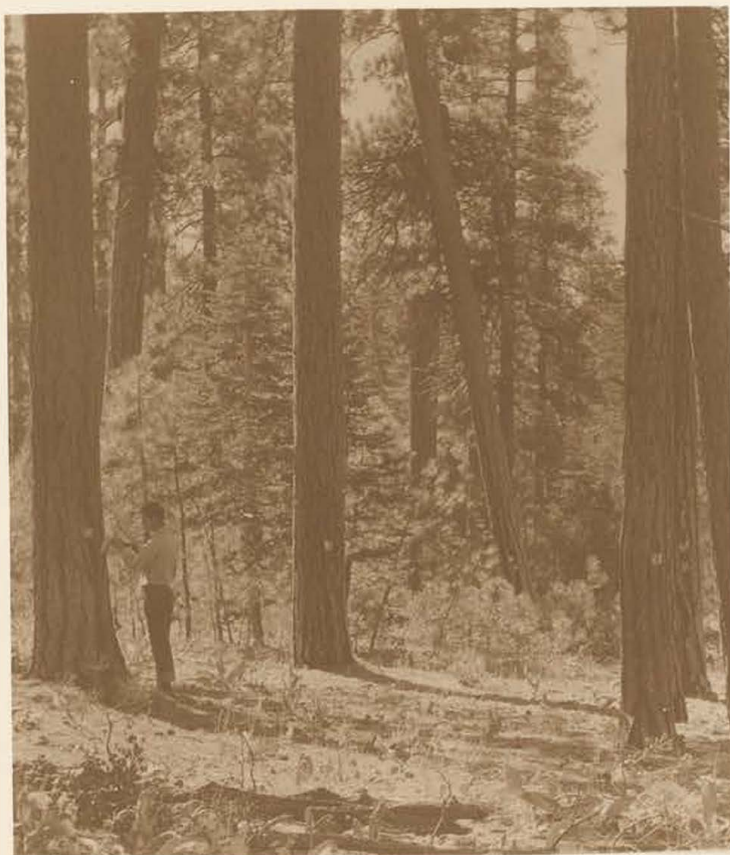
THE HIGH ARCH AND CATERPILLAR
TRACTOR SHOWN ABOVE MAKE A HIGHLY
MOBILE UNIT WHICH, IN TERRAIN THAT
IS NOT TOO ROUGH, CAN BE USED TO
REACH FAR OUT FROM ROADS TO BRING
IN SELECTED TREES.

MODERN TRUCKS ALSO ADD TO THE
MOBILITY OF SANITATION LOGGING.
WITH THIS EQUIPMENT, LOGS CAN BE
DELIVERED TO RAILROAD OR MILL OVER
SECONDARY FOREST ROADS.

EXPERIMENTAL PROJECTS TO TEST
AND FURTHER IMPROVE THE TECHNIQUE
OF HAZARD REDUCTION THROUGH SANITA-
TION LOGGING IS ONE OF THE NEEDS OF
A LONG TERM PROGRAM FOR FOREST IN-
SECT RESEARCH.



WHAT NEEDS TO BE DONE IN THE PONDEROSA PINE REGION



RESEARCH IS THE FIRST REQUIREMENT IN SOLVING THE BEETLE CONTROL PROBLEM

IN ORDER TO PROTECT THE VALUABLE PONDEROSA PINE STANDS OF CALIFORNIA, OREGON AND WASHINGTON FROM FURTHER PINE BEETLE DAMAGE, RESEARCH AND THE PRACTICAL APPLICATION OF ITS RESULTS TO FIELD CONDITIONS ARE ESSENTIAL. THE IMMEDIATE PROGRAM SHOULD INCLUDE:

STUDIES OF TREE SYMPTOMS INDICATIVE OF HIGH RISK AND SUSCEPTIBILITY TO PINE BEETLE ATTACK. (UPPER LEFT.)

HAZARD INVENTORY SURVEYS TO RATE AREAS ACCORDING TO THEIR RISK OF BEETLE ATTACK, AND TO PERMIT SALVAGE LOGGING IN ADVANCE OF BEETLE DAMAGE. (UPPER RIGHT.)

STUDIES TO DETERMINE THE UNDERLYING CAUSES OF BARKBEETLE EPIDEMICS AND HOW SUCH OUTBREAKS MAY BE CONTROLLED. (LEFT.)

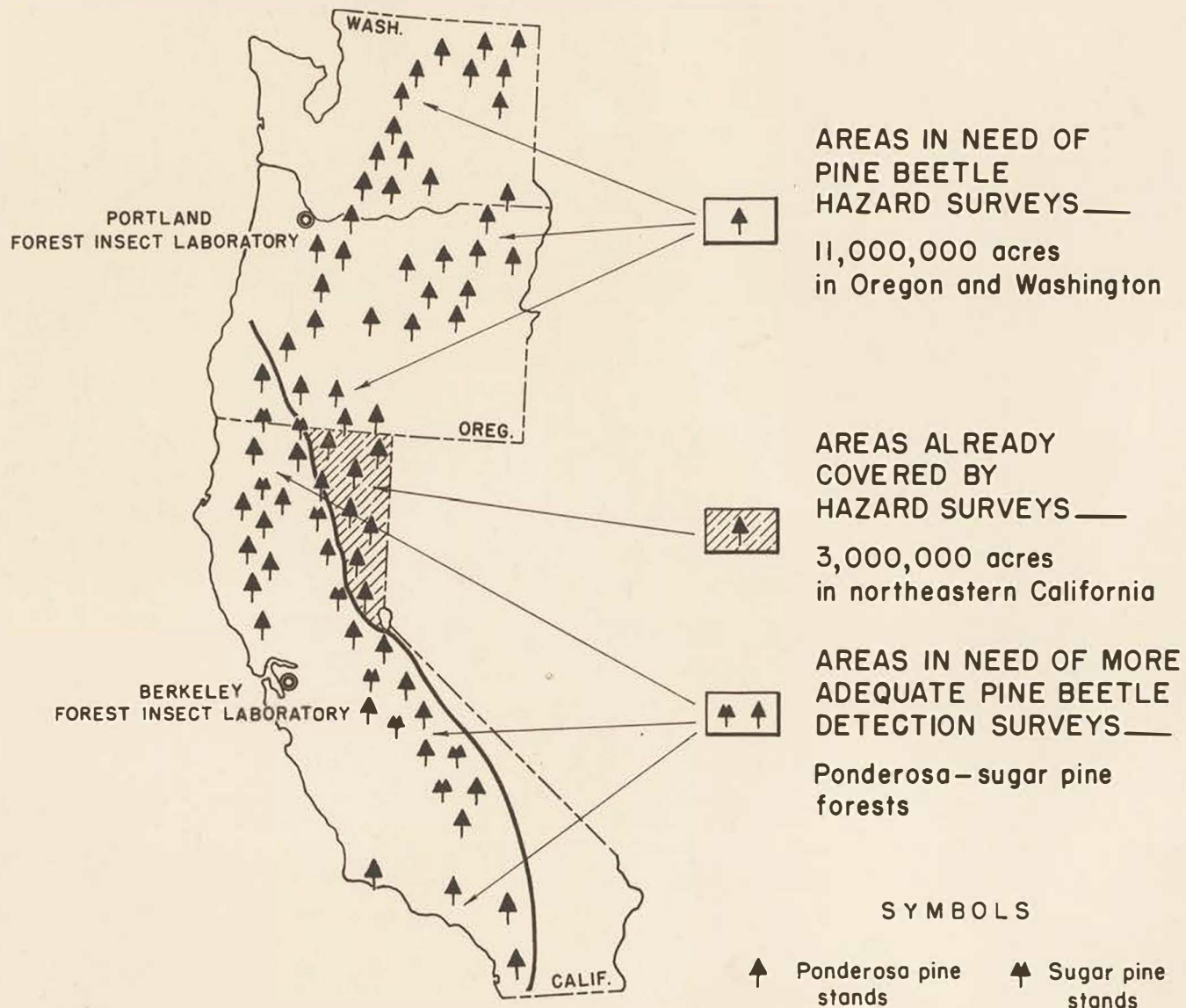


PINE BEETLE CONTROL REQUIREMENTS IN THE PACIFIC COAST STATES

DAMAGE FROM PINE BEETLE EPIDEMICS IS MOST CRITICAL IN THE FORESTS EAST OF THE CASCADE-SIERRA NEVADA MOUNTAIN RANGE. MOST PRIVATE AND FEDERAL TIMBER AGENCIES IN THIS REGION HAVE STANDS WHICH ARE FREQUENTLY SUBJECTED TO HEAVY LOSS.

BEETLE HAZARD SURVEYS ARE OF PRIMARY IMPORTANCE TO THESE AGENCIES IN DETERMINING WHAT AREAS ARE CURRENTLY ENDANGERED BY BEETLE EPIDEMICS AND THE MAGNITUDE OF THE RISKS INVOLVED IN DIFFERENT PORTIONS OF THEIR HOLDINGS.

THE REMOVAL OF HIGH RISK TREES BY SANITATION LOGGING IS THE KEYNOTE TO BEETLE CONTROL IN THESE HAZARDOUS AREAS.



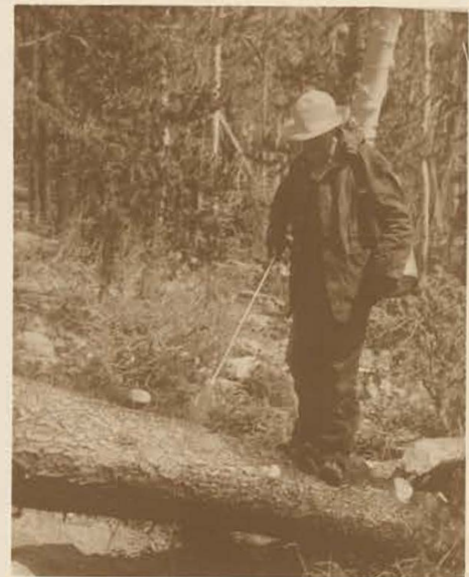
THIS PROGRAM IS URGENTLY NEEDED

1. EXTENSION OF PINE BEETLE HAZARD SURVEYS FOR THE INTELLIGENT PLANNING OF BEETLE CONTROL PROGRAMS.
2. CONTINUATION OF STUDIES AIMED AT THE IMPROVEMENT OF BEETLE CONTROL TECHNIQUE BY THE USE OF LOGGING METHODS.
3. EXTENSION OF SURVEYS FOR THE DETECTION OF PINE BEETLE OUTBREAKS AND THE STUDY OF INFESTATION TRENDS TO THOSE COMMERCIAL AND RECREATIONAL PINE STANDS NOT YET ADEQUATELY COVERED.

RESEARCH PROVIDES A BASIS FOR PROTECTING VALUABLE TIMBER STANDS OF THE INLAND EMPIRE AGAINST BEETLE ATTACK



FELLING AND BURNING INFESTED PINE TREES (ABOVE) IS A CONTROL MEASURE NOW WIDELY USED. IT IS EFFECTIVE, BUT EXPENSIVE. NEW AND LESS COSTLY METHODS OF CONTROL ARE NEEDED.



TREATING AN INFESTED LODGE-POLE PINE WITH PENETRATING OILS (ABOVE). THIS RECENTLY DEVELOPED METHOD IS VERY USEFUL WHERE FIRE HAZARD IS HIGH.

EFFECTIVE PINE BEETLE CONTROL DEPENDS UPON RESEARCH

THE MOST DESIRABLE SOLUTION OF THE PINE BEETLE PROBLEM IS PREVENTION OF OUTBREAKS. UNTIL THIS GOAL IS REACHED CONTROL IS ESSENTIAL.

THOUGH MUCH HAS BEEN DONE THROUGH RESEARCH, TO DEVELOP CONTROL METHODS, MUCH REMAINS TO BE DONE TO DEVELOP LESS COSTLY MEASURES.

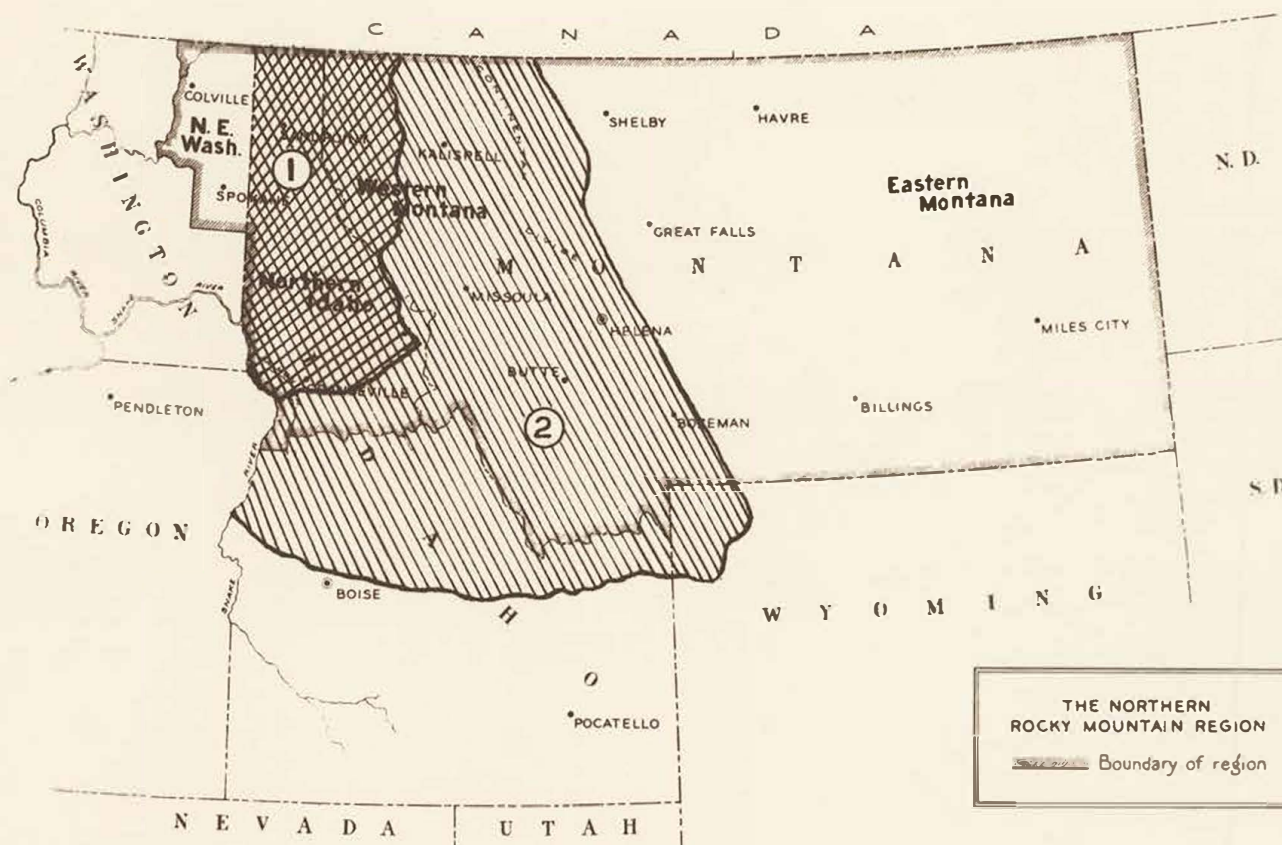
THE WEAKEST POINT IN THE APPLICATION OF CONTROL IS LACK OF INFORMATION NECESSARY TO DETECT OUTBREAKS WHILE CONTROL IS STILL PRACTICAL. STEPS ARE BEING TAKEN TO OBTAIN THIS INFORMATION THROUGH STUDIES OF THE INSECTS.

OUTBREAKS CAN BE PREVENTED BY REMOVING TREES ESPECIALLY SUBJECT TO BEETLE ATTACKS. STUDIES ARE IN PROGRESS TO DETERMINE TYPES OF SUSCEPTIBLE STANDS SO THAT THE TREES CAN BE UTILIZED BEFORE THEY ACT AS BREEDING GROUNDS FOR PINE BEETLES.



DETAILED STUDIES OF THE HABITS OF PINE BEETLES PROVIDE A BASIS FOR PREDICTING EPIDEMICS.

WHAT NEEDS TO BE DONE IN THE INLAND EMPIRE



THE PINE FORESTS OF THE INLAND EMPIRE IN NEED OF PROTECTION AGAINST PINE BEETLE DAMAGE ARE SHOWN ON THE MAP ABOVE. IN AREA 1 THERE ARE APPROXIMATELY 15 BILLION BOARD FEET OF COMMERCIALY VALUABLE WHITE PINE. OF THIS, 110 MILLION BOARD FEET ARE DESTROYED ANNUALLY BY PINE BEETLES. IN AREA 2 THERE WERE $19\frac{1}{2}$ BILLION BOARD FEET OF MERCHANT-ABLE LODGEPOLE PINE IN 1925. SINCE THEN A DISASTROUS PINE BEETLE EPIDEMIC HAS KILLED $7\frac{1}{2}$ BILLION BOARD FEET, OR 38 PERCENT OF THIS TIMBER RESOURCE.

THIS GREAT WASTE CAN BE MATERIALLY REDUCED BY ADOPTING THE FOLLOWING PROGRAM

1. INCREASE ANNUAL SURVEYS TO COVER ALL AREAS IN NEED OF PROTECTION, SO THAT ALL OUTBREAKS CAN BE DISCOVERED AND CONTROLLED BEFORE IT IS TOO LATE.
2. CONTINUE STUDIES TO DETERMINE THE TYPES OF STANDS PREFERRED BY PINE BEETLES, SO THAT THEY CAN BE LOGGED AHEAD OF THE BEETLES.
3. CONTINUE INVESTIGATIONS TO IMPROVE EXISTING CONTROL METHODS AND TO DEVELOP NEW METHODS THAT ARE LESS EXPENSIVE.

WHAT NEEDS TO BE DONE IN THE ROCKY MOUNTAIN REGION



MILLIONS OF DOLLARS HAVE BEEN INVESTED IN SUMMER HOMES IN THE FORESTS OF THE ROCKY MOUNTAINS. THESE HOMES ARE ATTRACTIVE CHIEFLY BECAUSE OF THEIR FOREST SETTING. RECENTLY PINE BEETLES HAVE KILLED MANY OF THE INVALUABLE PINES AT MOUNTAIN RESORTS. DEAD TREES, SUCH AS THE ONE BEING TREATED AT THE LEFT, ARE NO LONGER SCENIC ASSETS NOR CAN THEY BE REPLACED, BUT AN ADEQUATE CONTROL PROGRAM WILL PROTECT THE REMAINING TREES.

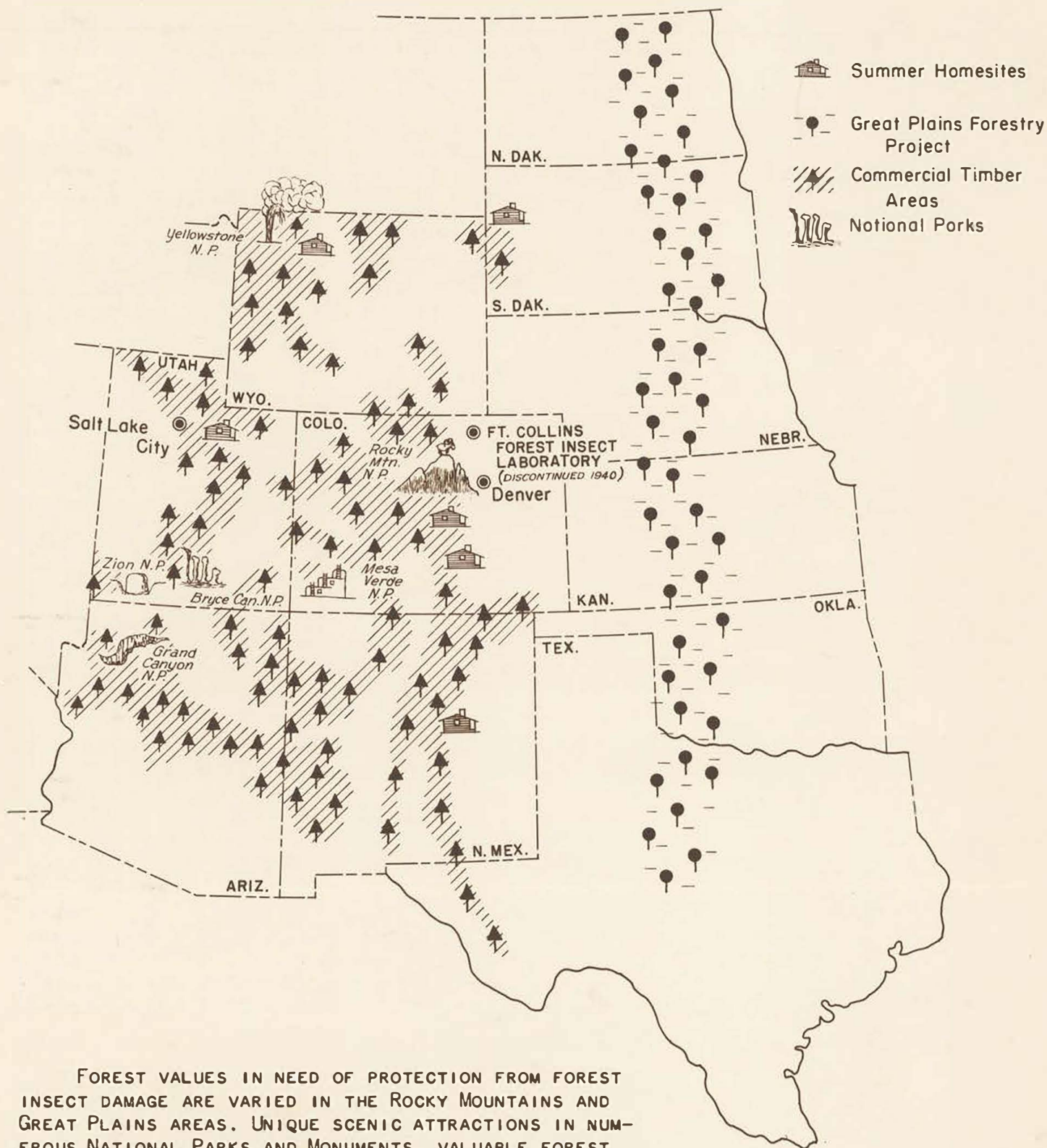
COMMERCIAL PINE TIMBER CONTRIBUTES MUCH TO LOCAL INDUSTRIES IN THE ROCKY MOUNTAIN STATES. THE COLORADO SCENE AT THE RIGHT, HOWEVER, DOES NOT ILLUSTRATE A PRODUCTIVE LOGGING OPERATION. THESE TREES WERE HARVESTED BY PINE BEETLES AND HAD TO BE FELLED AND BURNED TO PROTECT UNINFESTED AREAS. THE COURSE OF PINE BEETLE DESTRUCTION MUST BE STOPPED TO ASSURE CONTINUED PRODUCTION OF THE PINE FORESTS OF THE ROCKY MOUNTAIN REGION.



TREES HAVE BEEN ESTABLISHED AT GREAT EXPENSE IN THE GREAT PLAINS STATES. MANY OF THESE TREES ARE NOW BEING KILLED BY INSECTS. AT THE LEFT IS SHOWN THE REMNANTS OF A TREE CLAIM IN NEBRASKA, A TYPICAL EXAMPLE OF THIS KIND OF DESTRUCTION. PROTECTION OF THE HIGHLY VALUABLE TREES IN THE GREAT PLAINS IS GREATLY NEEDED.

REESTABLISHMENT OF THE LABORATORY AT FORT COLLINS, COLO., WOULD PROVIDE A MEANS FOR PROTECTING FOREST VALUES IN THE ROCKY MOUNTAIN AND GREAT PLAINS REGIONS AGAINST INSECT DEPREDACTIONS

ELEVEN STATES WITHOUT ADEQUATE PROTECTION AGAINST FOREST INSECTS



FOREST VALUES IN NEED OF PROTECTION FROM FOREST INSECT DAMAGE ARE VARIED IN THE ROCKY MOUNTAINS AND GREAT PLAINS AREAS. UNIQUE SCENIC ATTRACTIONS IN NUMEROUS NATIONAL PARKS AND MONUMENTS, VALUABLE FOREST TREES IN MOUNTAIN RESORT AREAS, 30 MILLION ACRES OF COMMERCIAL FOREST LAND, AND EXTENSIVE PLANTINGS IN THE GREAT PLAINS STATES SHOULD BE PROTECTED FROM INSECT RAVAGES.

WHAT NEEDS TO BE DONE

THE 300 BILLION BOARD FOOT TIMBER RESERVE NOW REMAINING IN THE PINE FORESTS OF THE WESTERN STATES IS BEING SERIOUSLY DEPLETED BY PINE BEETLES, AS SHOWN ON THE PRECEDING PAGES. FOREST INDUSTRIES, LABOR, LOCAL BUSINESS, WHOLE COMMUNITIES - ALL HAVE AN IMPORTANT STAKE IN THIS THREATENED RESERVE. DURING THE PAST 10 YEARS PINE BEETLES HAVE REDUCED THIS STAKE BY OVER \$300,000,000, IN THE PONDEROSA PINE STANDS OF CALIFORNIA, OREGON AND WASHINGTON ALONE. IT IS ONLY TOO OBVIOUS THAT THIS UNNECESSARY LOSS MUST BE STOPPED IF THE PINE PRODUCTION OF THE WEST IS TO CONTINUE ON A PERMANENT BASIS.

RESEARCH WORK OF THE BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE HAS BEEN SUCCESSFUL IN DEVELOPING PINE BEETLE CONTROL METHODS THAT CAN BE APPLIED TO FOREST AREAS OF HIGH VALUE. BUT THESE METHODS ARE COSTLY AND DIFFICULT TO APPLY; RESULTS ARE USUALLY OF SHORT DURATION. RECENT WORK HAS SHOWN PROMISE OF DEVELOPING MUCH CHEAPER AND MORE EFFECTIVE METHODS. THIS WORK SHOULD BE CONTINUED AND STRENGTHENED.

IN ORDER TO PROTECT WESTERN PINE FORESTS AGAINST FURTHER RAVAGES BY PINE BEETLES, IT IS ESSENTIAL THAT CERTAIN PROGRESSIVE STEPS BE TAKEN. SPECIFICALLY, FINANCIAL SUPPORT SHOULD BE GIVEN TO PROVIDE FOR:

I. A COMPREHENSIVE CONTROL PROGRAM IN THE PINE FORESTS OF CALIFORNIA, OREGON AND WASHINGTON.

THIS PROGRAM WOULD BE PUT INTO EFFECT BY:

- A) MAKING HAZARD SURVEYS TO CLASSIFY THE COMMERCIAL PINE STANDS OF THESE STATES AS TO BEETLE SUSCEPTIBILITY.
- B) PERFECTING METHODS OF LOGGING SUSCEPTIBLE TREES TO REDUCE HAZARD.
- C) CONDUCTING DETECTION SURVEYS AND DIRECT CONTROL, WHEN NECESSARY,

II. ADEQUATE PROTECTION OF THE VALUABLE WHITE PINE AND LODGEPOLE PINE OF THE NORTHERN ROCKY MOUNTAIN REGION.

THIS IS A TWO POINT PROGRAM INVOLVING:

- A) MORE COMPREHENSIVE SURVEYS TO COVER ALL THE FOREST LANDS OF IDAHO, MONTANA AND WYOMING THAT ARE IN DANGER OF PINE BEETLE OUTBREAKS.
- B) STUDIES TO DETERMINE TYPES OF STANDS THAT ARE MOST VULNERABLE TO MOUNTAIN PINE BEETLE ATTACK SO THAT SUCH STANDS CAN BE SALVAGED.

III. ADEQUATE PROTECTION OF THE COMMERCIAL AND RECREATIONAL FORESTS OF COLORADO, UTAH AND THE SOUTHERN ROCKY MOUNTAIN STATES.

THIS DEPENDS, FIRST OF ALL, UPON RESTORATION OF THE FOREST INSECT LABORATORY FORMERLY LOCATED AT FORT COLLINS, COLORADO.

ONCE THE LABORATORY HAS BEEN REOPENED, STEPS WOULD BE TAKEN TO:

- A) PROVIDE SURVEYS FOR FOREST LAND NOW THREATENED BY PINE BEETLES.
- B) DEVELOP METHODS OF PREVENTING AND CONTROLLING BEETLE OUTBREAKS.

THE TOTAL INCREASE OF FUNDS NEEDED FOR FISCAL YEAR 1942 BY THE BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE, DIVISION OF FOREST INSECT INVESTIGATIONS, TO CARRY OUT THE ABOVE PROGRAM IS ESTIMATED AT \$50,000.